a magnetic field generated by a solenoid coil and a microwave circuit into a vacuum chamber filled with gas to produce plasma in the chamber. Since this system produces the plasma with a high plasma density at a low gas pressure, the machining of samples can be conducted at a high speed with high precision. Additionally, a magneto- microwave plasma etching system using local magnetic fields produced by permanent magnets has been described in pages 1469 to 1471 of "Appl. Phys. Lett.", Vol. 62, No. 13 published in 1993. Since the magnetic fields are generated by permanent magnets, the production cost and power consumption are considerably reduced in comparison with the conventional system. JP-A-3-122294 describes a technology in which plasma is generated by high-frequency waves in a range from 100 megaherz (MHz) to one gigaherz (GHz) to efficiently etch samples by use of a magnetic mirror (mirror magnetic field). JP-A-6-224155 describes a technology in which high-frequency waves in a range from 100 MHz to 500 MHz are emitted from a comb-shaped antenna to produce uniform plasma in a chamber having a large diameter.

A1 cont

Page 2, replace the paragraph beginning t line 26 and bridging pages 2 and 3 with the following new paragraph:

It is therefore an object of the present invention to provide a plasma processing system and a plasma processing

A2

method to produce a uniform magneto- microwave plasma for a wide machining area with low power consumption.

A2
cnt

Page 4, replace the paragraph beginning at line 3 with the following new paragraph:

A3

Moreover, the systems of ECR type described in JP-A-3-122294 and JP-A-6-224155, however, electromagnetic waves are emitted from a position facing samples to be introduced to a plasma source of magneto-microwave plasma and hence only an insulating material can be placed at the position facing samples. In consequence, for example, when a high-frequency bias is to be applied to a sample, an earth electrode necessary for the bias cannot be placed at a desired or ideal position facing the sample. This leads to a problem of non-uniformity of the bias. Radicals in plasma exert essential influence on machining characteristics of samples. The radicals are under the influence of substances of walls of the vacuum chamber. Particularly, the substance of the wall at a position facing the sample and a distance between the wall and the sample conspicuously influence machining characteristics of the sample. In other words, the radicals can be controlled by the substance of the wall and the distance. However, in the conventional systems of ECR type, only an insulating material, i.e., only quartz or aluminum oxide can be installed in practices at the position facing the

A3 cont

sample, and hence the radicals cannot be controlled in a desired or ideal state.

Page 4, replace the paragraph beginning at line 26 and bridging pages 4 and 5 with the following new paragraph:

A4

In the systems of narrow electrode type, the electrode exists at a position opposing to the sample as distinct from the systems of ECR type. This consequently solves the problem of the earth electrode to bias the sample and the problem that the radicals cannot be controlled by the material facing the sample. However, the gas pressure is relatively high in the narrow electrode type and ions incident to the sample are non-uniform in directivity, which leads to deterioration in the fine micro-machining. Furthermore, since the distance between the electrodes is at most about 30 millimeters (mm), there arises a problem of a large pressure difference between positions in a machining surface of sample when a gas is introduced at a high flow rate. The phenomenon becomes more apparent as the diameter of samples increases, namely, this is an essential problem to be solved for the machining of wafers of the coming generation having a diameter of 300 mm.

Page 5, replace the paragraph beginning at line 24 and bridging pages 5 and 6 with the following new paragraph:

A5

In accordance with the present invention, there is provided a plasma processing system in which a highly uniform

magneto-microwave plasma is produced with low power consumption even when the sample has a large machining area. The system can conduct finer machining with high selectively and aspect ratio at a high speed. Particularly, radicals of the plasma are controlled with high precision independently of plasma generating conditions and hence the machining is achieved with high surface processing efficiency. Moreover, composition of radials is kept unchanged in the plasma for a long period of time to continuously obtain stable machining characteristics.

A5 cont

Page 9, replace the paragraph beginning at line 9 and bridging pages 9 and 10 with the following new paragraph:

Fig. 1 shows an embodiment of the present invention. This is a basic configuration of a plasma processing system. The configuration includes a vacuum chamber 2 including a gas introducing unit 1. Disposed on chamber 2 is a magnet 3A and 3B. Gas introduced into chamber 2 is transformed into plasma by interaction between electromagnetic magnetic waves introduced from a coaxial cable 4 onto a planar plate 5 and a magnetic field of magnet 3A and 3B to thereby machine a sample 6. Plate 5 to emit electromagnetic waves is equivalent to that described in JP-A-9-321031. The planar plate 5 has a shape of a disk and has a central section thereof connected to a conductor 34 having a shape of a circular cone of the coaxial cable 4. Applied to plate 5 are a frequency signal

A6

from a plasma generating power source of 450 MHz 7 and a power source of 13.56 MHz 9 via a filter 8. The magnetic field is required, in a plasma generation region between plate 5 and sample 6, to have intensity enough to cause electron cyclotron resonance. The magnetic field generated by the magnet 3A and 3B has magnetic lines of force with a direction vertical or substantially vertical to the planar plate 5 and the sample 6. Since a 450 MHz magnetic wave is employed in the embodiment of Fig, the intensity is in a range from 100 gauss to 200 gauss. Sample 6 has a diameter of eight inches and the distance between sample 6 and plate 5 is seven centimeters.

A6 cont

Page 17, replace the paragraph beginning at line 7 and bridging pages 17 and 18 with the following new paragraph:

By superposing power of 300 watt from 13.56 MHz power source 9 onto the 450 MHz wave, potential between film 10 on plate 5 and the plasma is adjusted. Sample 6 is a wafer with a diameter of 200 mm. The region of stand 11 which is brought into contact with sample 6 is kept at -20°C to regulate temperature of sample 6. Electromagnetic waves are fed from power source 18 onto sample 6 to control energy of ions fed from the plasma onto sample 6. Fig. 4 shows in a graph an etching speed of silicon oxide film and etching speed difference (selectivity) between silicon oxide film and silicon nitride film in the example above. The etching characteristic with respect to distance between silicon film

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